# **Contents**

## VOLUME 21 NUMBER 1

#### **MicroReviews**

 Bacterial growth inhibition by overproduction of protein
 C. G. Kurland & H. Dong

C. H. Johnson, S. D. Golden, M. Ishiura & T. Kondo

Circadian clocks in prokaryotes

## Research Articles

- An isogenic haemolysin-deficient mutant of Haemophilus ducreyi lacks the ability to produce cytopathic effects on human foreskin fibroblasts K. L. Palmer, W. E. Goldman & R. S. Munson, Jr
- 21 Influence of pili, fibrils, and capsule on *in vitro* adherence by *Haemophilus influenzae* type b J. W. St. Geme. III & D. Cutter
- 33 Quantitative analysis of the metabolism of soluble cytoplasmic peptidoglycan precursors of glycopeptide-resistant enterococci M. Arthur, F. Depardieu, P. Reynolds & P. Courvalin
- Splicing of a group II intron in a functional transfer gene of Lactococcus lactis
   C. Shearman, J.-J. Godon & M. Gasson
- 55 In vitro analysis of mRNA processing by RNase E in the pap operon of Escherichia coli
  S. Naureckiene & B. E. Uhlin
- 69 Modulation of lambda integrase synthesis by rare arginine tRNA
  K. Zahn & A. Landy
- A set of ordered cosmids and a detailed genetic and physical map for the 8 Mb Streptomyces coelicolor A3(2) chromosome
   M. Redenbach, H. M. Kieser, D. Denapaite,
   A. Eichner, J. Cullum, H. Kinashi & D. A. Hopwood
- 97 Isolation and characterization of a Pseudomonas aeruginosa gene, ptxR, which positively regulates exotoxin A production A. N. Hamood, J. A. Colmer, U. A. Ochsner & M. L. Vasil
- 111 A class of gyrase mutants of Salmonella typhimurium show quinolone-like lethality and require Rec functions for viability
  E. Garí, N. Figueroa-Bossi, A.-B. Blanc-Potard,
  F. Spirito, M. B. Schmid & L. Bossi
- Fate of peptides in peptidase mutants of Lactococcus lactis
   E. R. S. Kunji, I. Mierau, B. Poolman, W. N. Konings, G. Venema & J. Kok
- An alternative P<sub>II</sub> protein in the regulation of glutamine synthetase in *Escherichia coli* W. C. van Heeswijk, S. Hoving, D. Molenaar,
   B. Stegeman, D. Kahn & H. V. Westerhoff

- Purification and characterization of the integrase from the *Haemophilus influenzae* bacteriophage HP1; identification of a four-stranded intermediate and the order of strand exchange
  J. M. Hakimi & J. J. Scocca
- 159 Characterization of a Mycobacterium smegmatis gene that confers resistance to phages L5 and D29 when overexpressed E. K. Barsom & G. F. Hatfull
- 171 Yeast glutathione reductase is required for protection against oxidative stress and is a target gene for yAP-1 transcriptional regulation C. M. Grant, L. P. Collinson, J.-H. Roe & I. W. Dawes
- 181 The 19-residue pro-peptide of staphylococcal nuclease has a profound secretion-enhancing ability in *Escherichia coli* D. Suciu & M. Inouve

#### Obituaries

- In memoriam: Henry Wu, 1935–1996
   L. I. Rothfield & P. D. Rick
- 199 In memoriam: Shoji Mizushima, 1932–1996 T. Mizuno, H. Tokuda & M. Taqaya

#### Referees

201 Referees 1995

## VOLUME 21 NUMBER 2

#### MicroReviews

- 205 Recombination in mycobacteria
  J. McFadden
- 213 Three, four or more: the translational stop signal at length
  W. P. Tate & S. A. Mannering
- 221 Coating the surface: a model for expression of capsular polysialic acid in Escherichia coli K1 J. M. Bliss & R. P. Silver

- Purification and activities of the Rhodobacter capsulatus RpoN (σ<sup>N</sup>) protein
   W. Cannon, S. Missailidis, S. Austin, M. Moore,
   A. Drake & M. Buck
- 247 In vitro characterization of constitutive CysB proteins from Salmonella typhimurium
  T. E. Coyler & N. M. Kredich
- Definition of a consensus DNA-binding site for the Escherichia coli pleiotropic regulatory protein, FruR
   D. Nègre, C. Bonod-Bidaud, C. Geourjon, G. Deléage, A. J. Cozzone & J.-C. Cortay

267 Rhizobium leguminosarum bv. viciae contains a second fnr/fixK-like gene and an unusual fixL homologue

T. Patschkowski, A. Schlüter & U. B. Priefer

- 281 The clp (CS31A) operon is negatively controlled by Lrp, ClpB, and L-alanine at the transcriptional level C. Martin
- 293 A stringently controlled expression system for analysing lateral gene transfer between bacteria S. Jaenecke, V. de Lorenzo, K. N. Timmis & E. Díaz
- 301 A comprehensive set of DNA-box mutations in the replication origin, oriC, of Escherichia coli U. Langer, S. Richter, A. Roth, C. Weigel & W. Messer
- 313 FtsZ ring: the eubacterial division apparatus conserved in archaebacteria
  X. Wang & J. Lutkenhaus
- 321 Characterization of the fibronectin-attachment protein of *Mycobacterium avium* reveals a fibronectin-binding motif conserved among mycobacteria
  J. S. Schorey, M. A. Holsti, T. L. Ratliff, P. M. Allen & E. J. Brown
- The role of the AUU initiation codon in the negative feedback regulation of the gene for translation initiation factor IF3 in Escherichia coli
   C. Sacerdot, C. Chiaruttini, K. Engst, M. Graffe,

C. Sacerdot, C. Chiaruttini, K. Engst, M. Graffe, M. Milet, N. Mathy, J. Dondon & M. Springer

- 347 Escherichia coli translation initiation factor 3 discriminates the initiation codon *in vivo* J. K. Sussman, E. L. Simons & R. W. Simons
- 361 The coupling between ftsZ transcription and initiation of DNA replication is not mediated by the DnaA-boxes upstream of ftsZ or by DnaA R. W. P. Smith, S. McAteer & M. Masters
- 373 Protein F2, a novel fibronectin-binding protein from Streptococcus pyogenes, possess two binding domains

  J. Jaffe, S. Natanson-Yaron, M. G. Caparon & F. Hanski
- afsR is a pleiotropic but conditionally required regulatory gene for antibiotic production in Streptomyces coelicolor A3(2)
   B. Floriano & M. Bibb
- NodZ of Bradyrhizobium extends the nodulation host range of Rhizobium by adding a fucosyl residue to nodulation signals
   I. M. López-Lara, L. Blok-Tip, C. Quinto,
   M. L. Garcia, G. Stacey, G. V. Bloemberg,
   G. E. M. Lamers, B. J. J. Lugtenberg,
   J. E. Thomas-Oates & H. P. Spaink
- 409 Fucosylation and arabinosylation of Nod factors in Azorhizobium caulinodans: involvement of nolK, nodZ as well as noeC and/or downstream genes
  P. Mergaert, W. D'Haeze, M. Fernández-López, D. Geelen, K. Goethals, J.-C. Promé, M. Van Montagu & M. Holsters

421 Common cis-acting elements critical for the expression of several genes of Toxoplasma gondii
 C. Mercier, S. Lefebvre-Van Hende, G. E. Garber, L. Lecordier, A. Capron & M.-F. Cesbron-Delauw

## MicroCorrespondence

429 Adaptive mutations: an additional view D. J. Savic

## Erratum

431 Regulation by low temperatures and anaerobiosis of a yeast gene specifying a putative GPI-anchored plasma membrane
M. Donzeau, J.-P. Bourdineaud & G. J.-M. Lauquin

#### VOLUME 21 NUMBER 3

## **MicroReviews**

- 433 Questions about gonococcal pilus phase- and antigenic variation
  H. S. Seifert
- Overlaps and parallels in the regulation of intrinsic multiple-antibiotic resistance in Escherichia coli
   P. F. Miller & M. C. Sulavik

- Genetic analysis of the transcriptional arrangement of Azotobacter vinelandii alginate biosynthetic genes: identification of two independent promoters
   L. Lloret, R. Barreto, R. León, S. Moreno,
   J. Martínez-Salazar, G. Espín &
   G. Soberón-Chávez
- 459 Protein secretion by heterologous bacterial ABC-transporters: the C-terminus secretion signal of the secreted protein confers high recognition specificity

  F. Duong, A. Lazdunski & M. Murgier
- Competence pheromone, oligopeptide permease, and induction of competence in Streptococcus pneumoniae
   G. Alloing, C. Granadel, D. A. Morrison & J.-P. Claverys
- 479 Intracellular endosymbiotic bacteria of Camponotus species (carpenter ants): systematics, evolution and ultrastructural characterization D. Schröder, H. Deppisch, M. Obermayer, G. Krohne, E. Stackebrandt, B. Hölldobler, W. Goebel & R. Gross
- 491 In vivo immobilization of enzymatically active polypeptides on the cell surface of Staphylococcus carnosus
  A. Strauss & F. Götz
- 501 The Bacillus subtilis soj-spo0J locus is required for a centromere-like function involved in prespore chromosome partitioning M. E. Sharpe & J. Errington

- 511 CheC and CheD interact to regulate methylation of *Bacillus subtilis* methyl-accepting chemotaxis proteins
  M. M. L. Rosario & G. W. Ordal
- 519 The role of the Saccharomyces cerevisiae CCC1 gene in the homeostasis of manganese ions P. J. Lapinskas, S.-J. Lin & V. C. Culotta
- 529 Assembly proteins of CS1 pill of enterotoxigenic Escherichia coli
   H. Sakellaris, D. P. Balding & J. R. Scott
- 543 The use of differential display-PCR to isolate and characterize a *Legionella pneumophila* locus induced during the intracellular infection of macrophages
  Y. Abu Kwaik & L. L. Pederson
- 557 Differential binding of BvgA to two classes of virulence genes of *Bordetella pertussis* directs promoter selectivity by RNA polymerase T. Zu, R. Manetti, R. Rappuoli & V. Scarlato
- Integration host factor alleviates the H-NS-mediated repression of the early promoter of bacteriophage Mu
   P. van Ulsen, M. Hillebrand, L. Zulianello,
   P. van de Putte & N. Goosen
- Internalin must be on the bacterial cell surface to mediate entry of *Listeria monocytogenes* into epithelial cells
   M. Lebrun, J. Mengaud, H. Ohayon, F. Nato & P. Cossart
- 593 The positions of the sigma-factor genes, whiG and sigF, in the hierarchy controlling the development of spore chains in the aerial hyphae of Streptomyces coelicolor A3(2) G. H. Kelemen, G. L. Brown, J. Kormanec, L. Potúčková, K. F. Chater & M. J. Buttner
- 605 Examination of AsmA and its effect on the assembly of Escherichia coli outer membrane proteins

  M. Deng & R. Misra
- 613 Differential regulation of multiple overlapping promoters in flagellar class II operons in Escherichia coli
  X. Liu & P. Matsumura
- 621 ERA, a novel cis-acting element required for autoregulation and ethanol repression of PDC1 transcription in Saccharomyces cerevisiae
  T. Liesen, C. P. Hollenberg & J. J. Heinisch
- 633 A secreted protein tyrosine phosphatase with modular effector domains in the bacterial pathogen Salmonella typhimurium K. Kaniga, J. Uralil, J. B. Bliska & J. E. Galán
- 643 Activation of transcription at divergent ureadependent promoters by the urease gene regulator UreR S. E. F. D'Orazio, V. Thomas & C. M. Collins

#### MicroCorrespondence

A consensus structure for σ<sup>s</sup>-dependent promoters
 M. Espinosa-Urgel, C. Chamizo & A. Tormo

## VOLUME 21 NUMBER 4

#### **MicroReviews**

- Broad-host-range plasmid replication: an open question
   G. del Solar, J. C. Alonso, M. Espinosa &
   R. Díaz-Oreias
- 667 Three conserved consensus sequences identify the NAD-binding site of ADP-ribosylating enzymes, expressed by eukaryotes, bacteria and T-even bacteriophages

  M. Domenighini & R. Rappuoli
- 675 Two beginnings for a single purpose: the dual-start holins in the regulation of phage lysis U. Bläsi & R. Young
- 683 Photobiology of microorganisms: how photosensors catch a photon to initialize signalling
  K. J. Hellingwerf, W. D. Hoff & W. Crielaard

- 695 Genetically probing the regions of ribosebinding protein involved in permease interaction Y. Eym, Y. Park & C. Park
- 703 Effect of the deletion of the σ³²-dependent promoter (p1) of the Escherichia coli topoisomerase I gene on thermotolerance H. Qi. R. Menzel & T.-C. Tse-Dinh
- 713 Overexpression of the mexC-mexD-oprJ efflux operon in nfxB-type multidrug-resistant strains of Pseudomonas aeruginosa
  K. Poole, N. Gotoh, H. Tsujimoto, Q. Zhao,
  A. Wada, T. Yamasaki, S. Neshat, J. Yamagishi,
  X.-Z. Li & T. Nishino
- 725 Interaction of FimB and FimE with the fim switch that controls the phase variation of type 1 fimbriae in *Escherichia coli* K-12 D. L. Gally, J. Leathart & I. C. Blomfield
- 739 Catabolite repression mediated by the catabolite control protein CcpA in Staphylococcus xylosus
  O. Egeter & R. Brückner
- 751 The CII protein of bacteriophage 186 establishes lysogeny by activating a promoter upstream of the lysogenic promoter P. J. Neufing, K. E. Shearwin, J. Camerotto & J. B. Egan
- 763 Regulatory inputs for the synthesis of ComK, the competence transcription factor of *Bacillus* subtilis

  J. Hahn, A. Luttinger & D. Dubnau
- 777 A cytochrome c biogenesis gene involved in pyoverdine production in Pseudomonas fluorescens ATCC 17400
  A. Gaballa, N. Koedam & P. Cornelis
- 787 DsbA is required for stability of the type IV pilin of enteropathogenic Escherichia coli H.-Z. Zhang & M.S. Donnenberg

- 799 Interchange of the active and silent S-layer protein genes of Lactobacillus acidophilus by inversion of the chromosomal slp segment H. J. Boot, C. P. A. M. Kolen & P. H. Pouwels
- 811 The FinOP repressor system of plasmid R1: analysis of the antisense RNA control of traJ expression and conjugative DNA transfer G. Koraimann, K. Teferle, G. Markolin, W. Woger & G. Högenauer
- A new PrfA-regulated gene of Listeria monocytogenes encoding a small, secreted protein which belongs to the family of internalins

F. Engelbrecht, S.-K. Chun, C. Ochs, J. Hess, F. Lottspeich, W. Goebel & Z. Sokolovic

- The alpha subunit of RNA polymerase and transcription antitermination
   A. T. Schauer, S.-W. C. Cheng, C. Zheng,
   L. St. Pierre, D. Alessi, D. L. Hidayetoglu,
   N. Constantino, D. L. Court & D. I. Friedman
- 853 Regulation of competence for genetic transformation in *Streptococcus pneumoniae* by an auto-induced peptide pheromone and a two-component regulatory system
  E. V. Pestova, L. S. Håvarstein & D. A. Morrison
- 863 Identification of the streptococcal competence-pheromone receptor
   L. S. Håvarstein, P. Gaustad, I. F. Nes & D. A. Morrison
- 871 New components of protein folding in extracytoplasmic compartments of Escherichia coli, SurA, FkpA and Skp/OmpH
  D. Missiakas, J.-M. Betton & S. Raina

## MicroCorrespondence

885 On the misuse of the term 'lysozyme' E. García

## VOLUME 21 NUMBER 5

## **MicroReviews**

- 887 Back to log phase: σ<sup>S</sup> as a global regulator in the osmotic control of gene expression in *Escherichia coli* R. Hengge-Aronis
- The Clp ATPases define a novel class of molecular chaperones
   A. Wawrzynow, B. Banecki & M. Zylicz

- 901 Role of the periplasmic domain of the Escherichia coli NarX sensor-transmitter protein in nitrate-dependent signal transduction and gene regulation R. Cavicchioli, R. C. Chiang, L. V. Kalman & R. P. Gunsalus
- 913 Two-stage regulation of an anti-sigma factor determines developmental fate during bacterial endospore formation
  E. M. Kellner, A. Decatur & C. P. Moran, Jr

- 925 Identification of o<sup>S</sup>-dependent genes associated with the stationary-phase acidresistance phenotype of *Shigella flexneri* S. R. Waterman & P. L. C. Small
- 941 Regulation of competence development and sugar utilization in *Haemophilus influenzae* Rd by a phosphoenolpyruvate:fructose phosphotranferase system
  L. P. Macfadyen, I. R. Dorocicz, J. Reizer,
  M. H. Saier. Jr & R. J. Redfield
- 953 Activation of stable DNA replication in rapidly growing Escherichia coli at the time of entry to stationary phase
  X. Hong, G. W. Cadwell & T. Kogoma
- 963 Cloning and characterization of bfpTVW, genes required for the transcriptional activation of bfpA in enteropathogenic Escherichia coli T. Tobe, G. K. Schoolnik, I. Sohel, V. H. Bustamante & J. L. Puente
- 977 Identification of a CIpC ATPase required for stress tolerance and in vivo survival of Listeria monocytogenes
   C. Rouquette, M.-T. Ripio, E. Pellegrini,
   J.-M. Bolla, R. I. Tascon, J.-A. Vázquez-Boland
   & P. Berche
- 989 Replacement of the lysine residue in the consensus ATP-binding sequence of the AddA subunit of AddAB drastically affects chromosomal recombination in transformation and transduction of *Bacillus subtilis*B. J. Haijema, M. Noback, A. Hesseling, J. Kooistra, G. Venema & R. Meima
- 1001 Ferric uptake regulator mutants of Pseudomonas aeruginosa with distinct alterations in the iron-dependent repression of exotoxin A and siderophores in aerobic and microaerobic environments H. A. Barton, Z. Johnson, C. D. Cox, A. I. Vasil & M. L. Vasil
- 1019 Exotoxin A production in Pseudomonas aeruginosa requires the iron-regulated pvdS gene encoding an alternative sigma factor U. A. Ochsner, Z. Johnson, I. L. Lamont, H. E. Cunliffe & M. L. Vasil
- The P1 ParA protein and its ATPase activity play a direct role in the segregation of plasmid copies to daughter cells
   M. A. Davis, L. Radnedge, K. A. Martin, F. Hayes, B. Youngren & S. J. Austin
- 1037 Nucleotide sequence and role in DNA amplification of the direct repeats composing the amplifiable element AUD1 of Streptomyces lividans 66

  J.-N. Volff, C. Eichenseer, P. Viell, W. Piendl & J. Altenbuchner
- 1049 Programmed cell death in bacteria: translational repression by mRNA end-pairing T. Franch & K. Gerdes
- Membrane topology of the yeast uracil permease
   C. Garnier, M.-O. Blondel & R. Haguenauer-Tsapis

1075 The cutRS signal transduction system of Streptomyces lividans represses the biosynthesis of the polyketide antibiotic actinorhodin

H.-M. Chang, M.-Y. Chen, Y.-T. Shieh, M. J. Bibb & C. W. Chen

1087 Molecular characterization of group A streptococcal (GAS) oligopeptide permease (Opp) and its effect on cysteine protease production

A. Podbielski, B. Pohl, M. Woischnik, C. Körner, K.-H. Schmidt, E. Rozdzinski & B. A. B. Leonard

Salmonella spp. are cytotoxic for cultured macrophages
 L. M. Chen, K. Kaniga & J. E. Galán

#### VOLUME 21 NUMBER 6

## **MicroReviews**

1117 Expression, secretion and antigenic variation of bacterial S-layer proteins
H. J. Boot & P. H. Pouwels

#### Research Articles

- 1125 Effects of systematic variation of the minimal Escherichia coli met consensus operator site: in vivo and in vitro met repressor binding
  C. M. Wild, T. McNally, S. E. V. Phillips &
  P. G. Stockley
- 1137 A hierarchical quorum-sensing cascade in Pseudomonas aeruginosa links the transcriptional activators LasR and RhIR (VsmR) to expression of the stationary-phase sigma factor RpoS A. Latifi, M. Foglino, K. Tanaka, P. Williams & A. Lazdunski
- 1147 A cyclophilin-like peptidyl-prolyl cis/trans isomerase from Legionella pneumophila characterization, molecular cloning and overexpression

  B. Schmidt, T. Tradler, J.-I.I. Bahfeld, B. Ludw.

B. Schmidt, T. Tradler, J.-U. Rahfeld, B. Ludwig, B. Jain, K. Mann, K. P. Rücknagel, B. Janowski, A. Schierhorn, G. Küllertz, J. Hacker & G. Fischer

- 1161 Multicopy fimB gene expression in Escherichia coli: binding to inverted repeats in vivo, effect on fimA gene transcription and DNA inversion
  S. L. Dove & C. J. Dorman
- Structural analysis and proteolytic activation of Enterococcus faecalis cytolysin, a novel lantibiotic
   M. C. Booth, C. P. Bogie, H.-G. Sahl, R. J. Siezen,

K. L. Hatter & M. S. Gilmore

1185 Protein folding in the cytoplasm of Escherichia coli: requirements for the DnaK-DnaJ-GrpE and GroEL-GroES molecular chaperone machines
J. G. Thomas & F. Baneyx

1197 Role of the conserved carboxy-terminal α-helix of Rad6p in ubiquitin and DNA repair Y. Dor, B. Raboy & R. G. Kulka

1207 RbfA, a 30S ribosomal binding factor, is a cold-shock protein whose absence triggers the cold-shock response
P. G. Jones & M. Inouye

1219 Conversion of an extracellular cytolysin into a phagosome-specific lysin which supports the growth of an intracellular pathogen S. Jones, K. Preiter & D. A. Portnoy

1227 Transcriptional control of the agr-dependent virulence gene regulator, RNAIII, in Staphylococcus aureus

E. Morfeldt, K. Tegmark & S. Arvidson

1239 The general L-amino acid permease of Rhizobium leguminosarum is an ABC uptake system that also influences efflux of solutes D. L. Walshaw & P. S. Poole

1253 Role of the stoichiometry between mRNA, translation factor SelB and selenocysteyl-tRNA in selenoprotein synthesis P. Tormay, A. Sawers & A. Böck

1261 Cis preference of the IS903 transposase is mediated by a combination of transposase instability and inefficient translation K. M. Derbyshire & N. D. F. Grindley

1273 Carbon catabolite repression of xylanase I (xyn1) gene expression in *Trichoderma reesei* R. L. Mach, J. Strauss, S. Zeilinger, M. Schindler & C. P. Kubicek

1283 Topology of diphtheria toxin in lipid vesicle membranes: a proteolysis study
P. Quertenmont, R. Wattiez, P. Falmagne,
J.-M. Ruysschaert & V. Cabiaux

#### MicroCorrespondence

1297 A global gene pool in the neisseriae M. C. J. Maiden, B. Malomy & M. Achtman

#### Corrigendum

1299 Induction of complex intracytoplasmic membranes related to nitrogen fixation in Azoarcus sp. BH72 T. Hurek, M. Van Montagu, E. Kellenberger & B. Reinhold-Hurek

## Indexes

1301 Keyword Index

1305 Author Index